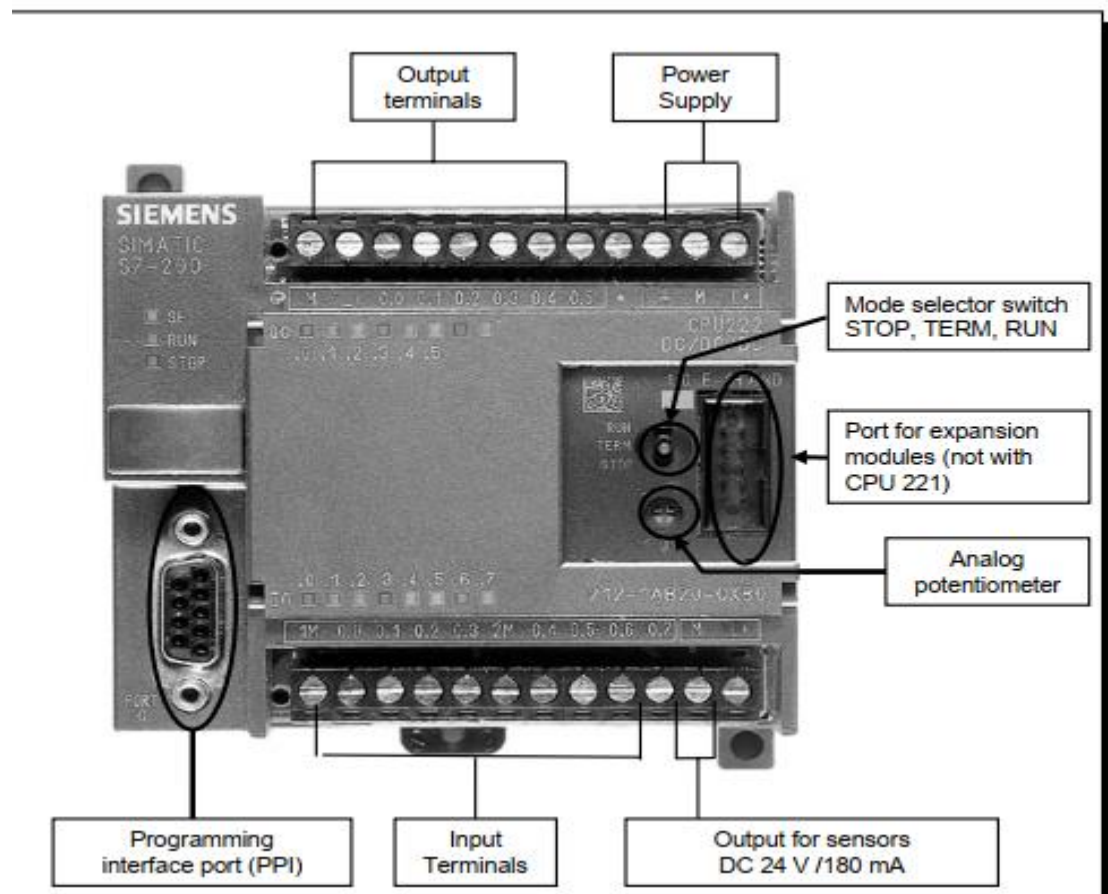


4.1 S7-200 micro PLCs

The S7-200 Micro PLC is the smallest member of the SIMATIC S7 family of programmable controllers. The central processing unit (CPU) is internal to the PLC. Inputs and outputs (I/O) are the system control points. Inputs monitor field devices, such as switches and sensors. Outputs control other devices, such as pumps. The programming port is the connection to the programming device



4.2 S7-200 CPU

There are five S7-200 CPU types: CPU 221, CPU 222, CPU 224, CPU 224XP, and CPU 226

4.2.2 CPU used

CPU 224 14: digital input, 10: digital output

Expandable to 7 modules It is connected to the plc device by cable.

CPU 224 DC/DC/DC means
24Vdc for CPU/24Vdc for Input /24Vdc for Output

4.2.3 Internal protection for PLC:

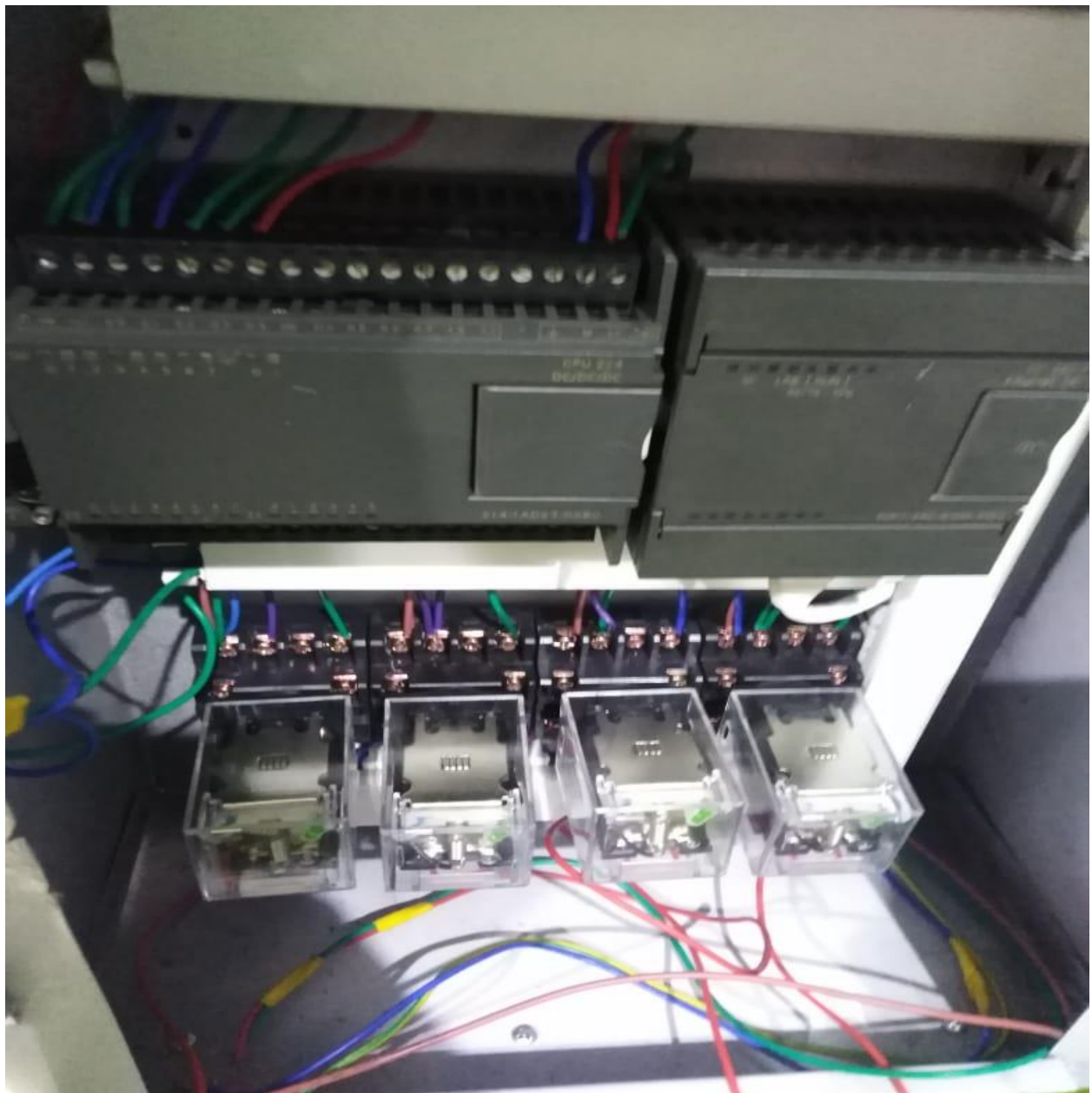
PROTECTION

- 1 → Optical coupler for input protection. •
- 2 → Relay interface for output protection. •



4.3 Status indicators

- Run: Green color when the plc works.
- Stop: Green color when the plc stops.
- System Fault: Red color because of a problem.



4.4 Input& Output Used:

Input	Address	Output	Address
Start N. o	I 0.0	Pump1	Q 0.0
Stop N. c	I 0.1	Pump2	Q 0.1
Tank1. low	I 0.2	Motor	Q 0.2
Tank1.high	I 0.3	Pump3	Q 0.4
Tank2.low	I 0.4	Alarm	Q 0.5
Tank2.high	I 0.5		
Tank3.low	I 0.6		
Tank3.high	I 0.7		

4.5 What is sensor

A Sensor converts the physical parameter (for example: temperature, blood pressure, humidity, speed, etc.) into a signal which can be measured electrically

It can be classified as: Analog and digital sensors

4.5.1 Criteria to choose a Sensor:

There are certain features which have to be considered when we choose a sensor. They are as given below:

- Accuracy
- Environmental condition
- Range - Measurement limit of sensor.
- Cost

4.5.2 Sensor used:

- Electrode water level sensor:

Electrode sensor basically requires physical contact with the water to detect the water level. The water act as resistance. Small electronic current will be passing through the water which helps the sensor to sense the water level. For this reason, not all liquid can use this sensor for detection. One example is oil, which has an insulating property in nature

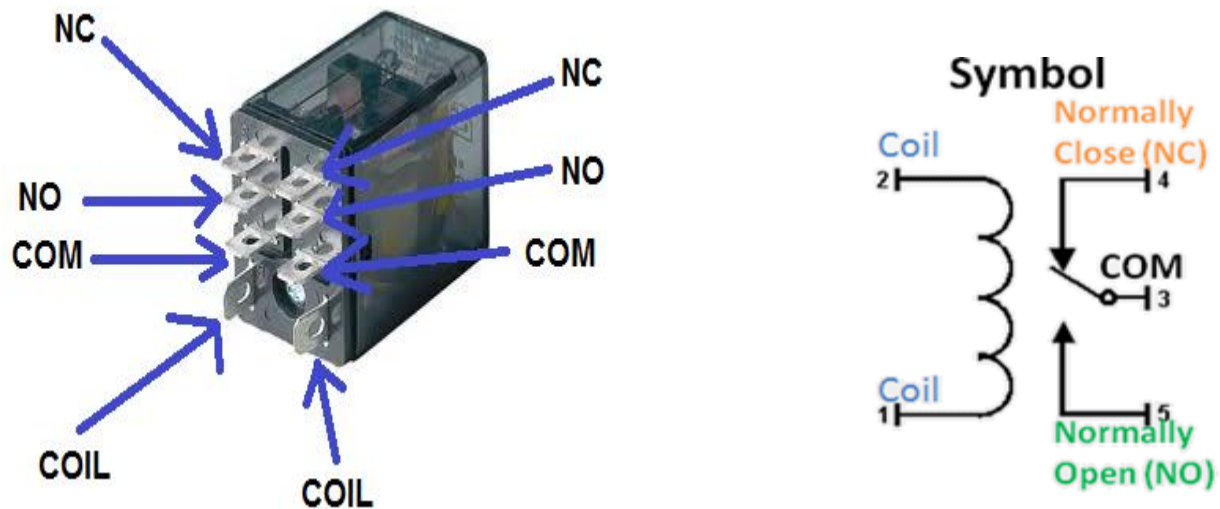
- For a typical water tank or rainwater level detection, the electrode sensor is an affordable and commonly used method to detect the amount of water in a tank compared to other water level sensing method.

-An electrode sensing needs at least two contact point to function. For electrode with only a single probe, the other end of the sensor wire will be connected to a metallic tank (usually of stainless steel material). The metallic tank will act as the second probe. If the tank is not metal, or you do not want to connect the sensor wire to your tank, you can use a two probe electrode.

4.6 Wiring output:

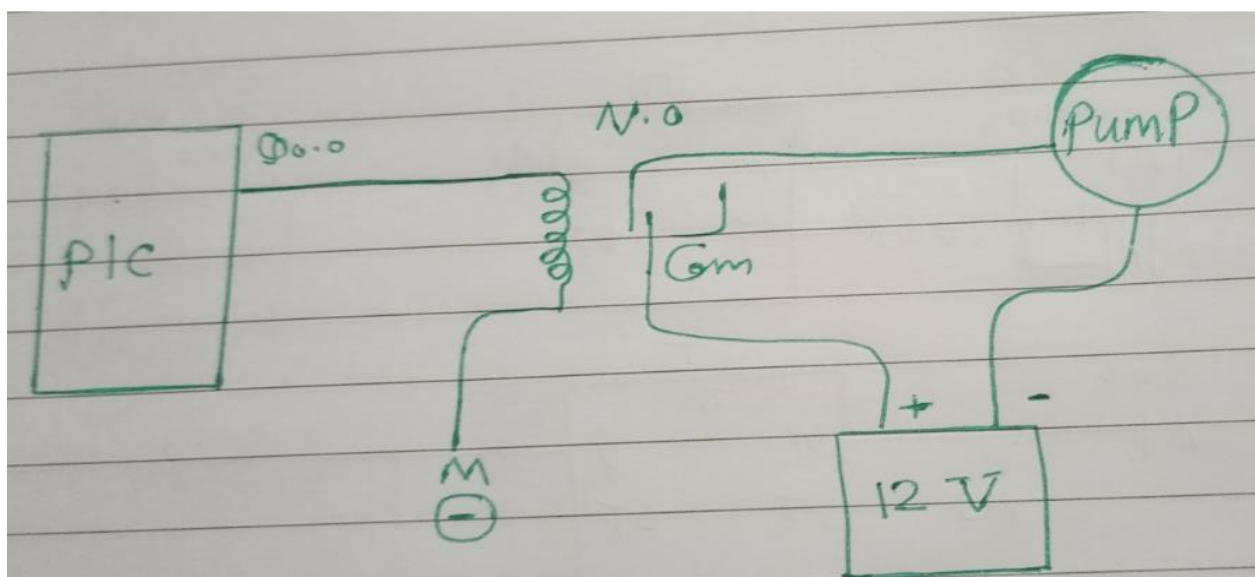
4.6.1 Relays

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have double throw(changeover) switch contacts as shown in the diagram



- Relay isolates control circuit from power circuit because both circuits are linked together magnetically not by electrical wires
- Cheap and simple
- Static field and noise don't affect in it

4.6.2 pumps: 12V – 0.5A



The pumps are in three stages. The first stage is the distribution well to pass the water to the Clarifiers.

The second stage is the Clarifiers well to pass the water to Filters.

The third stage is the Filters well to pass to Ground water tank.

4.6.3 Motor with Timer:

To stir the water molecules reacting with the added chlorine to precipitate the large particles down the clarifier

4.6.4 Alarm:

To predict the end of the operation.

4.7 Programming language used:

4.7.1 Ladder Diagram (LD):

Ladder logic (LAD) is one programming language used with PLCs. Ladder logic uses components that resemble elements used in a line diagram format to describe hard-wired control.

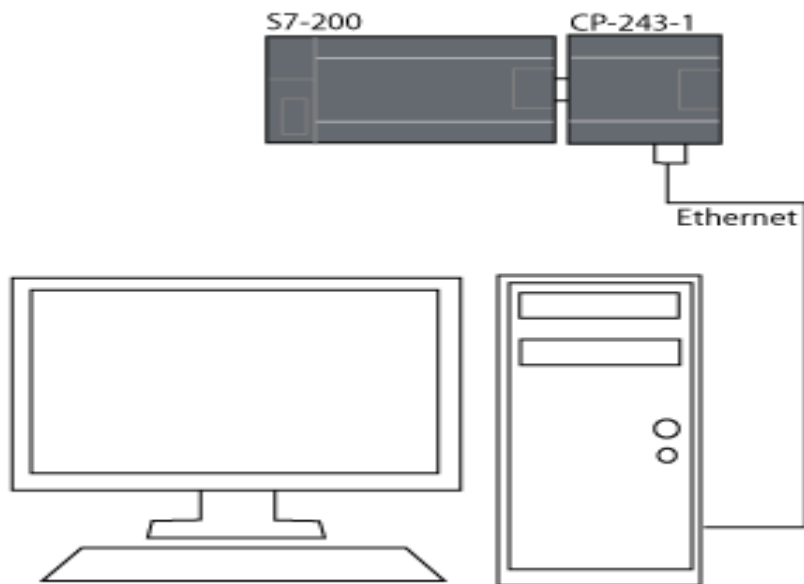
4.7.2 Rules for writing ladder diagram:

- Determine I/P and O/P
- Select wires (NO or NC) for inputs
- Select addresses for inputs and outputs
- Write ladder
- Don't duplicate any coil (output runs and stops from the same rung)

4.8 Programming Port:

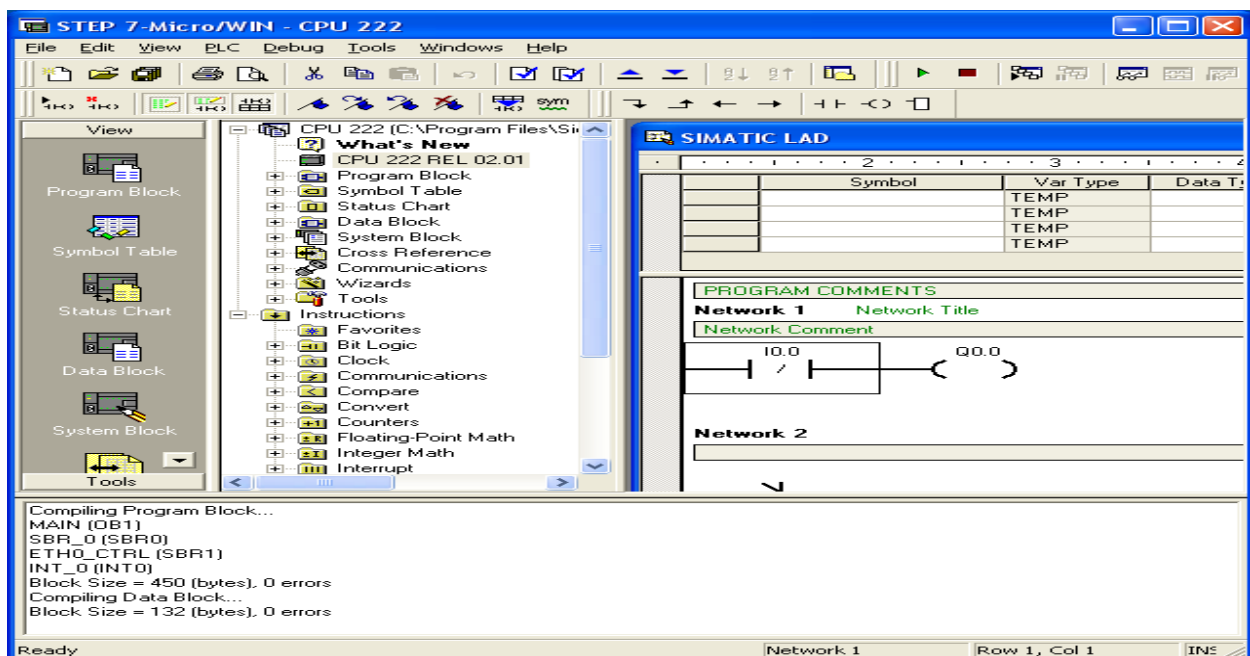
- Point-to-Point Interface: Dedicated for S7-200.
- Multi Point Interface: Dedicated for All Siemens Devices Only.
- Ethernet Communication Card: It is used in our project to send information from the computer to the plc.

higher fully support the CP-243-1 Ethernet communication modules.



4.8.1 Setting up the Siemens S7-200 PLC:

-Start Siemens Step 7-Micro/Win and load your PLC project:



- Click Read Modules to read the position and type of module attached to the PLC. If successful the Module ID will show the module:

Ethernet Wizard

This wizard will help you define the parameters for the CP 243-1 Ethernet module. The wizard will then place this configuration in your project.

Specify Module Position
To configure the module, specify the module's position relative to the PLC. Click 'Read Modules' to search for installed CP 243-1 Ethernet modules.

Module Position
0

Read Modules

Position	Module ID
0	CP243-1 ETHERNET

< Prev Next > Cancel

Module Address page

Ethernet Wizard

Module Address
If your network provides a BOOTP server (a service that will automatically assign IP addresses at startup), you may choose to have an IP address automatically assigned.

IP Address: . . .

Subnet Mask: 255 . 255 . 255 . 0

Gateway Address: . . .

☐ Allow automatic IP address assignment.

Module Connection Type
Specify the communications connection type for this module.

Auto Detect Communications

< Prev Next > Cancel

4.8.2 S7-1200 with module cp-243-1



4.9 The final Design:



